

XI. *A large Tubularian* (*Tubularia regalis*, Boeck) from the Moray Firth. By Prof. J. ARTHUR THOMSON, M.A.

(Read 16th December 1907.)

On 23rd March 1907, the "Goldseeker," engaged in the international scientific exploration of the North Sea, dredged from a depth of 39 fathoms in the Moray Firth (58° N., 2° 38' W.) a magnificent colony of a species of *Tubularia*, which seems to be an addition to the list of British Hydroids. Through the kindness of Prof. D'Arcy W. Thompson, C.B., I obtained the specimen for examination, and my conclusion is that it is referable to *Tubularia regalis*, described in 1859 from Spitzbergen by Chr. Boeck.

The beautiful cluster of polyps is about a foot in height, and strikes one at once as larger and more substantial than similar clusters of the common *Tubularia indivisa*, which it resembles in general colouring. The height of a single hydrocaulus, measured apart from the interlaced tangle at the base, varies from 7-10 inches, and to this the large hydranth may add nearly another inch (20-22 mm.). The breadth of the hydrocaulus is about 3 mm., and the largest hydranth at its broadest part has, in the contracted preserved state, a width of about 20 mm. There are 12-15 longitudinal lines on the clear perisarc, corresponding to vermilion lines on the cœnosarc which shine through.

There are 32-36 proximal tentacles from 12-22 mm. in length, and the maximum spread of the tentacles, measured along a diameter of the circle which they form, is about 60 mm. The distal tentacles form a dense brush, consisting of several close tiers around the mouth. From 76 to 92 were counted on various hydranths. Each distal tentacle is about 4 mm. in length, 0.4 mm. across the base, tapering to 0.1 mm. at the tip.

Immediately above the bases of the proximal tentacles, 12 to 14 unbranched blastostyles or pendulous racemes

of gonophores are inserted. They hang down, regularly interpolated, among the proximal tentacles, which they equal in length (12-22 mm.). On several of these pendulous racemes, 48 gonophores were counted. The gonophores are oval in form, with average diameters of 1 mm. and 2 mm. Some of them show a very long spadix, but there is no trace of radial canals.

The question of present interest is, To which species of *Tubularia* does this magnificent Moray Firth specimen belong? We may at once dismiss the small species, such as *T. larynx* and *T. bellis*, and confine our attention to those which are often or usually over 6 inches in length, namely, *T. regalis*, Boeck, *T. indivisa*, L., *T. variabilis*, Bonnevie, and *T. insignis*, Allman.

Taking the last first, we find that, according to Allman, the hydrocaulus of *T. insignis* attains a height of 7 inches or more. Indeed, the monographer notes that "it far surpasses in size every British representative of the genus." But the hydrocaulus of our Moray Firth specimen may attain a height of 10 inches. The hydranth of *T. insignis* (which was found at Dieppe) was about half an inch in height from base to summit, but several hydranths in our specimen originally stood up for nearly an inch. We mention these facts to emphasise the large dimensions of our specimen. We need not, however, delay over *T. insignis*, for besides differing markedly as regard its tentacles, it is removed from any close systematic proximity to our specimen by more important differences relating to the blastostyles. In *T. insignis* the blastostyles are "in six or seven imbricated verticels, with about twenty in each verticel, not pendulous," whereas our specimen has 12 to 14 pendulous blastostyles.

The next on the list is the large *T. variabilis*, Bonnevie, which has a height of 100-300 mm., distinct longitudinal striping, 25-35 proximal tentacles (15-20 mm. in length), 10-20 blastostyles (20 mm. in length), and is thus in many respects like our specimen. But it again may be left out of account, since its gonophores are characterised by 3-6 high external ribs corresponding to a similar variable number of

radial canals, whereas the gonophores of our specimen have no ribs and show no radial canals. For similar reasons, we need not consider either *T. asymmetrica*, Bonnevie, or *T. obliqua*, Bonnevie, which have rudimentary tentacles on the gonophores.

Is it then possible that the Moray Firth specimen is simply a very large and luxuriant representative of the common *T. indivisa*, perhaps like the vaguely known *T. gigantea* of Lamouroux, which attained a height of 12-15 inches, and was regarded by Allman as "probably only a large form of *T. indivisa*"? If the radial canals are absent from the gonophores of the Moray Firth specimen, as they appear to be, then it cannot be identified with *T. indivisa*, whose gonophores have four radial canals; but it seems undesirable to press this point, since our specimen has not been adequately fixed. The difficulty of deciding whether our specimen is or is not referable to *T. indivisa* is complicated by the fact that there are considerable differences between Allman's and Hincks's descriptions. The real difficulty is that we cannot judge as to the specific value of numerical and quantitative differences without examining a large number of specimens, which we have not, as yet, been able to do.

It may be pointed out that the difference between Allman's "40 distal tentacles" and our 76-92 is very considerable, but Hincks simply says "very numerous." Similarly, the difference between Allman's "3 or 4 pendulous racemes of gonophores" and our 14 is also very considerable, but again Hincks says "numerous." On the whole, however, the numerical and quantitative differences seem to warrant us in separating our specimen from *T. indivisa*, and it seems to us that it should be referred to Boeck's Spitzbergen species, *T. regalis*.

In contrasting *T. indivisa* and *T. regalis*, Miss Bonnevie notes that the former has 4 radial canals on its gonophores, while the latter has none; that the former has 20-30 proximal tentacles, about 10 mm. in length, while the latter has 20-30, 20-40 mm. in length; that the former has 3-10 blastostyles, while the latter has 10-20, 35 mm. in length.

Our specimen resembles *T. regalis* (1) in having bright red longitudinal lines on the coenosarc, which are seen shining through the clear perisarc; (2) in the breadth of the hydrocaulus (3 mm.); (3) in the great height and breadth of the hydranth; (4) in the length of the proximal tentacles (up to 22 mm.); (5) in the length of the distal tentacles (3-4 mm.); (6) in the shape and arrangement and length of the blastostyles; (7) in the long spadix within the gonophores; and (8) in showing no trace of radial canals.

Our specimen differs from *T. regalis*, as described by Boeck, (1) in having 32-36 proximal tentacles instead of 28, but Bonnevie says 20-30; (2) in having shorter proximal tentacles and blastostyles, 12-22 mm. instead of 42-45 mm., but Bonnevie gives 20-40 mm. as the length of the tentacles and 35 mm. as the length of the blastostyles. It should also be noted that our specimen was considerably contracted by preservation before the measurements were taken. Boeck figured the blastostyles as if they stood up vertically, but Allman pointed out that this position is impossible.

Before giving a tabular comparison, which will show the resemblances and differences at a glance, we may supplement the descriptions of *T. regalis* by a reference to the hydro-rhiza, which was absent in the specimens obtained by the Norwegian North Atlantic Expedition, and was left unnoticed by Boeck. As Miss Bonnevie supposed, the lower part of the hydrocaulus is composite, as in *T. indivisa*. The stems are twisted together in a tangle at the base. It may also be noted that one hydrocaulus bears a small barnacle, *Scalpellum vulgare*.

Species.	Hydrocaulus.	Hydranth.	Proximal Tentacles.	Distal Tentacles.	Blastostyles.	Gonophores.	
<i>T. indivisa</i> (as described by Alhman).	Ht. 76-226 mm. Br. 2.5 mm.	....	20-30.	40.	3 or 4 pendulous racemes, surpassing the hydranth in length.	Oviform, without tentaculiform tubercles; 4 radial canals.	
<i>T. indivisa</i> (as described by Hincks).	Ht. 150-300 mm.	....	About 40.	Very numerous.	Gonophores on branched peduncles, forming large and very numerous clusters.	With four radiating canals, and four small tubercles at their terminations.	
<i>T. indivisa</i> (as summed up by Bonnevie).	Ht. 100-300 mm. With longitudinal striping, no collar.	....	20-30, about 10 mm. long.	Several circles, very close together; 2-3 mm. long.	3-10, male longer than female.	No tentacles; 4 radial canals.	
<i>T. regalis</i> (as described by Boeck).	Ht. 120-130 mm. Br. over 3 mm. With longitudinal bright red stripes.	18 mm. in height.	23, 42-45 mm. in length, with a maximum spread of 80-85 mm.	Very numerous; 3-4 mm. in length.	Simple racemes, equal in length to the proximal tentacles, and alternating with them.	Oviform, without tentaculiform tubercles, with a long spadix.	Near Spitzbergen.
<i>T. regalis</i> (as described by Bonnevie).	Ht. 100-300 mm. With longitudinal striping, no collar. The actual stems measured were over 200 mm. in length.	Hydranths measured from 7 to 9 cm. beyond [across?] the proximal tentacles.	20-30, 15-40 mm. long; also stated as 20-40 mm. long.	Several circles, very close together; 2-3 mm. long.	10-20; length 35 mm., in a circle just within that of the proximal tentacles.	No tentacles; no radial canals.	72° 27' N., 20° 51' E.; 349 metres. 76° 34' N., 12° 51' E.; 1359 metres.
The Moray Firth Specimen.	Ht. 175-250 mm. Br. 3 mm. With about 15 bright red lines on the coenosarc shining through the clear perisarc.	20-22 mm. in height; 20 mm. in maximum breadth.	32-36, 12-22 mm. in length, with a maximum spread of about 60 mm.	76-92; 4 mm. in length.	12-14 pendulous simple racemes, 12-22 mm. in length.	Oviform, without tentacles; apparently without radial canals; with a long spadix.	58° N., 2° 38' W.; 39 fathoms.

The results of this short note on a very beautiful specimen may be summed up in a sentence. There exists in the Moray Firth a large species of *Tubularia*, differing considerably from the familiar *T. indivisa*, and closely resembling *T. regalis*; if it be referred to the latter, as seems justifiable, a new record is made for British waters, and a distinctively northern form, previously recorded from near Spitzbergen and from far to the north of Norway, is shown to have an interesting extension of its range southwards.

REFERENCES TO LITERATURE.

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